

I claim:

- 1     1. A direct current voltage converter for converting an input voltage into an output voltage comprising:
  - 3         - a unit for preparing a reference voltage having a ground terminal which is connected with a first common fixed potential,
  - 5         - a regulator for regulating the output voltage to a predetermined fraction of the reference voltage, wherein a first voltage, that is derived from the output voltage, is applied to a first input of the regulator, a second voltage, that is derived from the reference voltage is applied to a second input of the regulator, and a control voltage may be tapped at an output of the regulator,
  - 10         - a pulse width modulator for comparing the control voltage with an alternating voltage,
  - 12         - a voltage-controlled pole-changing switch comprising two inputs and an output for connecting one of the two inputs with the output, the input voltage being applied to one of the two inputs and a second common fixed potential being applied to the other of the inputs and a control terminal of the voltage-controlled pole-changing switch may be supplied by the pulse width modulator,
  - 17         - a storage choke, the input of which is connected with the output of the voltage-controlled pole-changing switch, and the output voltage may be tapped at the output thereof,
  - 20         - a smoothing capacitor, the first terminal of which is connected with the output of the storage choke and the second terminal thereof being connected with a third common fixed potential,
  - 23         - a reference potential, to which the first voltage and the second voltage drop, is connected through an insulated line with the second terminal of the smoothing capacitor, and
  - 26         - a low pass filter connected between the unit for preparing the reference voltage and the second input of the regulator, the low pass filter having a capacitor,

28 one terminal of which is connected via the insulated line with the second terminal of  
29 the smoothing capacitor.

1 2. The direct current voltage converter in accordance with Claim 1, wherein the  
2 other terminal of the capacitor is coupled with the low pass filter at the second input of  
3 the regulator, and

4 - the low pass filter has a resistor, which is connected between the unit for  
5 preparing the reference voltage and the second input of the regulator, and in particular  
6 includes a further capacitor which is connected between the unit for preparing the  
7 reference voltage and the first common fixed potential.

1 3. The direct current voltage converter in accordance with Claim 1, wherein a  
2 voltage divider, one input of which is connected with the output of the storage choke  
3 and the other input of which is connected with the second terminal of the smoothing  
4 capacitor, is connected in front of the first input of the regulator.

1 4. The direct current voltage converter in accordance with Claim 1, wherein  
2 - the pulse width modulator comprises a comparator and a generator for  
3 generating a saw-tooth voltage, the saw-tooth voltage being applied to the first input of  
4 the comparator and the control voltage being applied to the second input of the  
5 comparator.

1 5. The direct current voltage converter in accordance with Claim 1, wherein the  
2 voltage-controlled pole-changing switch includes an MOS transistor, the drain-source  
3 space of which is supplied by the input voltage and which, in particular is an n-channel  
4 MOS transistor, and a diode, which is coupled with the second common fixed  
5 potential.

1 6. The direct current voltage converter in accordance with Claim 1, wherein at  
2 least the regulator, in a given case the comparator, in a given case the low pass filter  
3 and in a given case the voltage divider are monolithically integrated on one common

4 substrate, the common substrate having a ground terminal and which may be  
5 connected by the insulated line with the second terminal of the smoothing capacitor.

1 7. The direct current voltage converter in accordance with Claim 1, wherein the  
2 second terminal of the smoothing capacitor is connected with an external common  
3 fixed potential, in particular a ground.

1 8. The direct current voltage converter in accordance with Claim 6, wherein the  
2 common substrate may be connected with the external common fixed potential  
3 exclusively via the ground connection.

1 9. The direct current voltage converter in accordance with Claim 7, wherein  
2 further noise-sensitive components are integrated on the common substrate, the  
3 reference potentials of which components are connected with the ground terminal of  
4 the common substrate.

1 10. The direct current voltage converter in accordance with Claim 1, wherein the  
2 unit for preparing the reference voltage is a band spacing reference circuit.

1 11. The direct current voltage converter in accordance with Claim 6, wherein an  
2 MOS driver is connected between the pulse width modulator and the MOS transistor.

1 12. The direct current voltage converter in accordance with Claim 1, wherein the  
2 regulator has an operation amplifier, which is connected in particular as a proportional  
3 integral regulator.

1    13.    A method for converting an input voltage into an output voltage comprising the  
2    steps of:

3                - preparing a reference voltage in relation to a first common potential,  
4                - regulating the output voltage to a predetermined fraction of the reference  
5    voltage, wherein a first voltage is derived from the output voltage and a second voltage  
6    is derived from the reference voltage, and a control voltage is derived from the first  
7    and second voltage,  
8                - comparing the control voltage with an alternating voltage,  
9                - connecting the input voltage or a second common fixed potential with a first  
10   output depending on the comparison of the control voltage,  
11                - coupling the first output through a storage choke and a smoothing capacitor  
12   with a third common fixed potential wherein the output voltage is accessible at the  
13   coupling of the choke and the capacitor, and  
14                - low pass filtering the reference voltage in relation to the third common fixed  
15   potential to generate the second voltage, wherein the control voltage is generated in  
16   relation to the third common fixed potential.

1    14.    The method in accordance with Claim 13, wherein the step of comparing  
2    includes the step of generating a saw-tooth voltage.